Survey of shell egg use in catering establishments in Finland

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Summary

Raw and undercooked eggs and egg products are common food vehicles of *Salmonella* Enteritidis outbreaks, of which a significant proportion originates from different types of catering establishments. In this study, egg purchasing, storage and preparation practices of small, medium and large restaurants, public institutional kitchens and staff canteens were surveyed using a postal questionnaire. The purchasing and storage practices of eggs depended on the kitchen type but not on the size. Dishes containing raw and undercooked eggs were prepared in all the kitchen types. The results showed that risky practices were common in catering establishments in Finland. Therefore, caterers need to be aware of the *Salmonella* risk related to the shell egg use.

Introduction

Salmonella is a leading cause of food-borne infections in many countries. In 2002, over 145,000 cases of human salmonellosis were reported in the European Union and in Norway. The main serovar involved was *Salmonella* Enteritidis, which caused 67.1% of all notified cases (European Commission 2004). During years 1993 to 1998, *S.* Enteritidis was reported to have caused 1,409 outbreaks in Europe. Thirteen percent of the reported outbreaks took place in restaurants, cafeterias and other catering services, 11% at schools, kindergartens and homes for elderly and 7% in medical care facilities (WHO 2001). The significance of the outbreaks occurring in the catering industry was even greater in the United States, where 62% of the reported outbreaks caused by *S.* Enteritidis were associated with commercial food establishments in 1985 - 1991. During the same time period, 11% of the outbreaks occurred in hospitals or nursing homes (Patrick *et al.*, 2004).

In epidemiological surveys, eggs and egg containing dishes have been recognized as the single most important food source of *S.* Enteritidis outbreaks (Angulo & Swerdlow, 1999). Especially consumption of raw eggs and undercooked egg dishes is considered as the major risk factor (Patrick *et al.*, 2004). While trends of *S.* Enteritidis outbreaks have been actively monitored and major food vehicles have been recognized, the actual food consumption patterns as well as common food handling practices at homes and in catering establishments have been paid less attention. The objectives of the present study were to survey how different types of catering establishments purchase and store shell eggs and what kind of egg dishes they prepare. This kind of information can be utilized when risks related to the shell egg use are evaluated and appropriate control measures are designed. A corresponding approach has already been applied to evaluate egg handling and preparation practices in Finnish households (Lievonen *et al.*, 2004).

Materials and methods

A postal survey was sent to 223 catering establishments in February 2004. The respondents were chosen to represent restaurants (including bars, fast-food, catering services, etc.), public institutional kitchens (schools, kindergartens, hospitals, nursing homes, etc.) and staff canteens, which serve lunches during working days. Each category was further divided into three sub-categories: small (serving under 200 portions a day), medium-sized (serving 200 – 499 portions a day) and large (serving over 2000 portions a day) kitchens. The addresses of the kitchens were taken from the

HoReCa (HotelRestaurantsCatering) directory hold by AC Nielsen Market Research Company. The sampling method was stratified sampling. Thirty kitchens were randomized into each category, except into the categories of large restaurants and staff canteens, because there were only 12 such kitchens in Finland. These twelve kitchens were all included into the survey.

The questionnaire contained 30 questions. The majority of the questions were asked about different types of egg dishes prepared with the average preparation frequency and a typical number of portions prepared. In addition, purchasing frequency, storage time and temperature of shell eggs were asked.

Results

RESPONSE RATE

From all kitchens surveyed, 171 (77%) responded. Some of them only gave information about purchasing and storage practices, and some answered that they did not use eggs at all. From all respondents, 141 (63%) provided satisfactory information about egg dishes prepared. The response rate was fairly constant in every category, except the large staff canteens (Table 1).

Table 1 Number of the catering establishments which provided complete egg preparation data in each category. The response rate of the category is shown in the parenthesis.

Kitchen type	10 – 199 portions a day	200 – 499 portions a day	> 2000 portions a day	Total
Restaurants: restaurants, cafeterias, bars, hotels, etc.	17 (57%)	18 (60%)	2 (50%)	37
Staff canteens	13 (43%)	19 (67%)	2 (25%)	34
Institutional kitchens: kindergartens, schools, hospitals, etc.	24 (80%)	22 (73%)	24 (77%)	70
Total	54	59	28	141

PURCHASING AND STORAGE OF EGGS

Seventy-eight per cent of the respondents used only shell eggs, 19% used both shell eggs and egg products and 4% used only egg products. Small kitchens typically used only shell eggs, whereas large units used both shell eggs and egg products. However, the kitchens using solely egg products included only fast food retailers and small bars or pubs which served few egg dishes on their menu. The shell eggs were usually purchased once a week (61% of the respondents). The purchasing behaviour did not depend on the size of the kitchen, but on the type of the kitchen.

The majority of all respondents (82%) stored eggs at cool temperature as recommended. Fifty-nine per cent stored eggs in coolers, 13% in refrigerators and 10% in cold rooms. On the other hand, 18% of the respondents stored shell eggs at room temperature. The size of the kitchen did not have effect on storage temperature, but the kitchen type did (Figure 1).

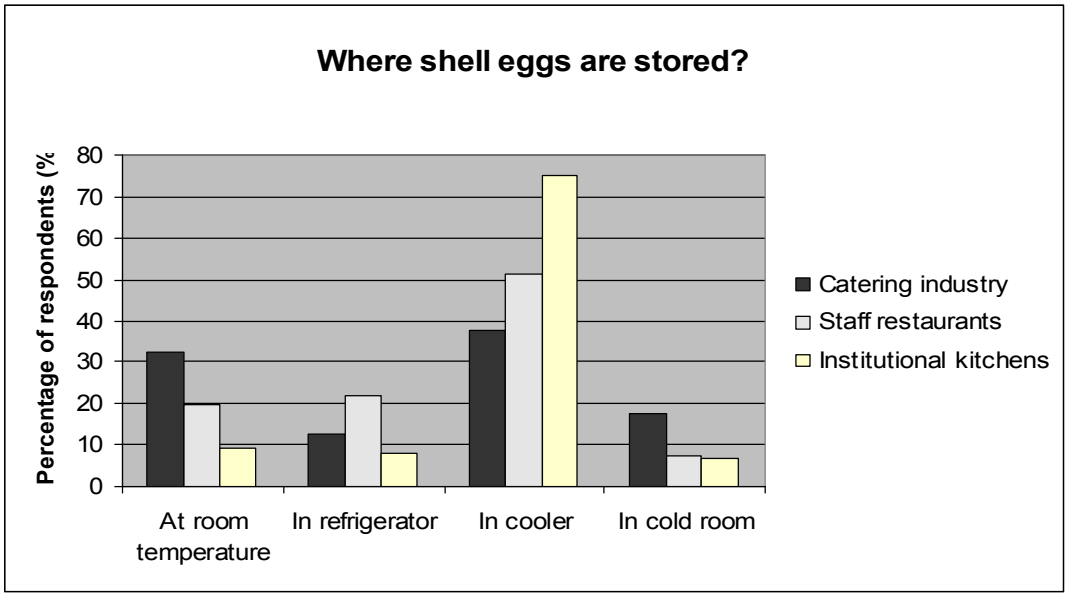

Figure 1 Storage of shell eggs by the different types of catering establishments in Finland. Number of the respondents was 157.

EGG USE

The most common egg dish prepared was hard-boiled eggs, which were prepared by 86.5% of the respondents. Other well-cooked egg dishes - pancakes, self-made bakery products, casseroles with eggs and fried eggs - were also popular, and they were prepared by 48 – 71% of the respondents. Undercooked and raw egg dishes were prepared less frequently and their consumption varied in different kitchen types. The most common risky egg dishes prepared were desserts containing raw eggs and self-made mayonnaise (Table 2).

Table 2 Proportion of the respondents preparing different undercooked and raw egg dishes.

Dish categories	Egg dishes	Prepared by all respondents (%)
Undercooked egg dishes	Eggs fried sunny side up	22,0
	Whipped egg white	15,6
	Sauces	13,5
	Soft-boiled eggs	10,6
	Poached eggs	6,4
	Runny scrambled eggs	5,7
	Runny omelettes	3,5
Raw egg dishes	Cold desserts with eggs	22,0
	Self-made mayonnaise	20,6
	Raw eggs as such	7,8
	Self-made ice cream	3,5
	Cold drinks	1,4

Conclusion

According to this study, Finnish catering establishments typically use shell eggs. Even the large kitchens which served over 2000 portions a day, reported that they used both shell eggs and egg products – not solely egg products. In Finland, the use of egg products has traditionally been low and the selection of egg products has been limited. The consumption of unpasteurised shell eggs in the catering branch would be a risk factor for *Salmonella* outbreaks if *Salmonella* prevalence in eggs were high.

In this study, effects of the size and the type of the kitchens on shell egg purchasing and storage practices were surveyed. The size of the kitchen did not affect much the handling practices, whereas the type of the kitchen had a more significant effect. For instance, the purchasing frequency of eggs and the temperature at which eggs were stored differed according to the kitchen type. To assess the significance of the observed differences related to the shell egg use, more information is needed about the purchase, storage and preparation practices of shell eggs in different sectors of the catering establishments.

All different egg dishes surveyed were prepared by the respondents. Even though preparation of risky egg dishes was not as common as preparation of well-cooked egg dishes, it was reported by every type of the catering establishments studied including the public institutional kitchens which serve meals to vulnerable population sub-groups such as small children and the elderly. Therefore the caterers should be aware of the *Salmonella* risk related to the shell egg use.

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